

Table of Contents

Chapter 5.0

Concentrations of Trace Metals	73
--	-----------

Chapter 5.0

Concentrations of Trace Metals

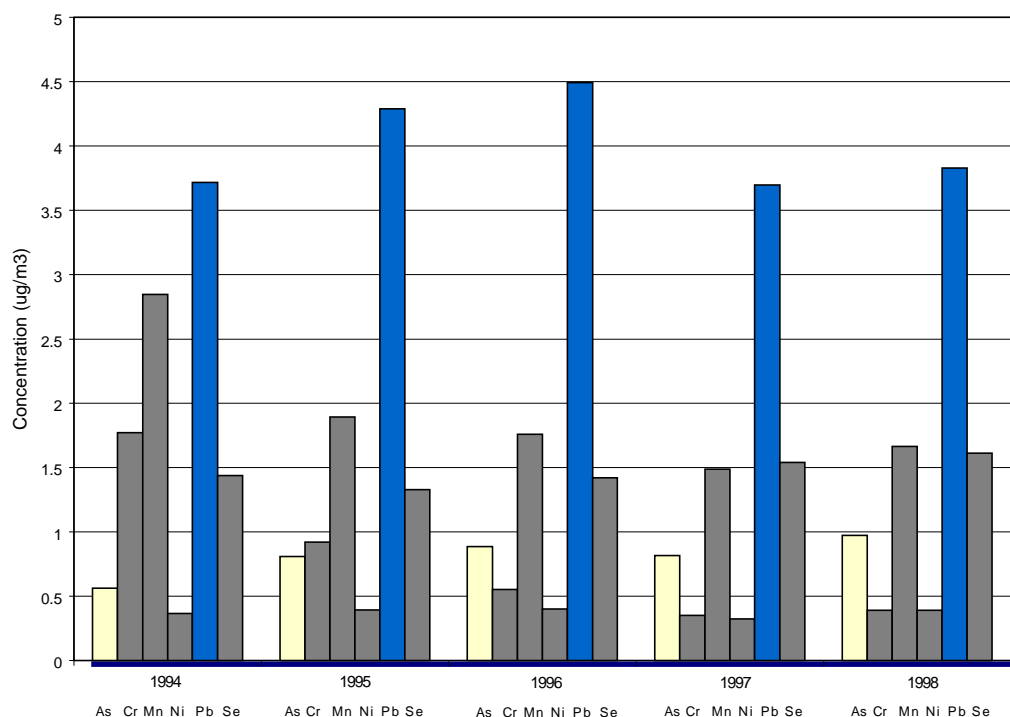


EPA has identified 11 trace metals that have been designated as Hazardous Air Pollutants (HAPs): antimony (Sb), arsenic (As), beryllium (Be), cadmium (Cd), cobalt (Co), chromium (Cr), lead (Pb), manganese (Mn), mercury (Hg), nickel (Ni), and selenium (Se). Eight of these (excluding Sb, Co, and Se) are considered to be priority HAPs in the new integrated urban strategy. Teflon® filters that are exposed for 24 hours at the eight CASTNet visibility sites are analyzed via XRF for trace elements. The XRF analysis produces information on concentrations of nine of the trace metals that are regulated by EPA. These nine metals include: arsenic, cadmium, chromium, lead, manganese, mercury, nickel, cobalt, and selenium. This section summarizes measurements of these metals over the period 1994 through 1998.

Quarterly and annual concentrations were calculated for a composite eight-station database for the 5-year period. The same procedures for interpolating missing data and averaging that were discussed in Chapter 2 (under the Ten-Year Trends subsection) were used, with the exception that 60% data completeness was required for a valid quarterly average.

Figure 5-1 depicts annual average concentrations for six of the nine metals. The three metals (cadmium, mercury, and cobalt) that are not shown had zero (non-detect) concentrations from the XRF analyses for all years. Concentrations of lead are the highest of the six metals, with average concentrations ranging up to 6.0 nanograms per cubic meter (ng/m^3). Figures 5-2 through 5-7 provide box plots based on 24-hour average concentrations for each year over the 5-year period. All levels are less than $10.0 \text{ ng}/\text{m}^3$.

Figure 5-1. Annual Average Composite (8 Sites) Trace Metal Concentrations



Notes:

1. All concentrations are reported with blank corrections.
2. Detection limits are calculated by analyzing 10 blank filters and calculating three times the standard deviation of each set of measured trace elements. This value is considered the detection limit, e.g., As 0.158 ng/m³; Cr 0.158 ng/m³; Mn 0.216 ng/m³, Ni 0.116 ng/m³; Pb 0.408 ng/m³; Se 0.141 ng/m³.
3. Concentration values less than the detection limit are flagged with "<" in the CASTNet database. However, these values were used directly in the averages and distributions. All 24-hour concentration values of Cd, Hg, and Co were below the detection limit and were not processed.

Figure 5-2. Annual Average Trends in Composite Arsenic Concentrations

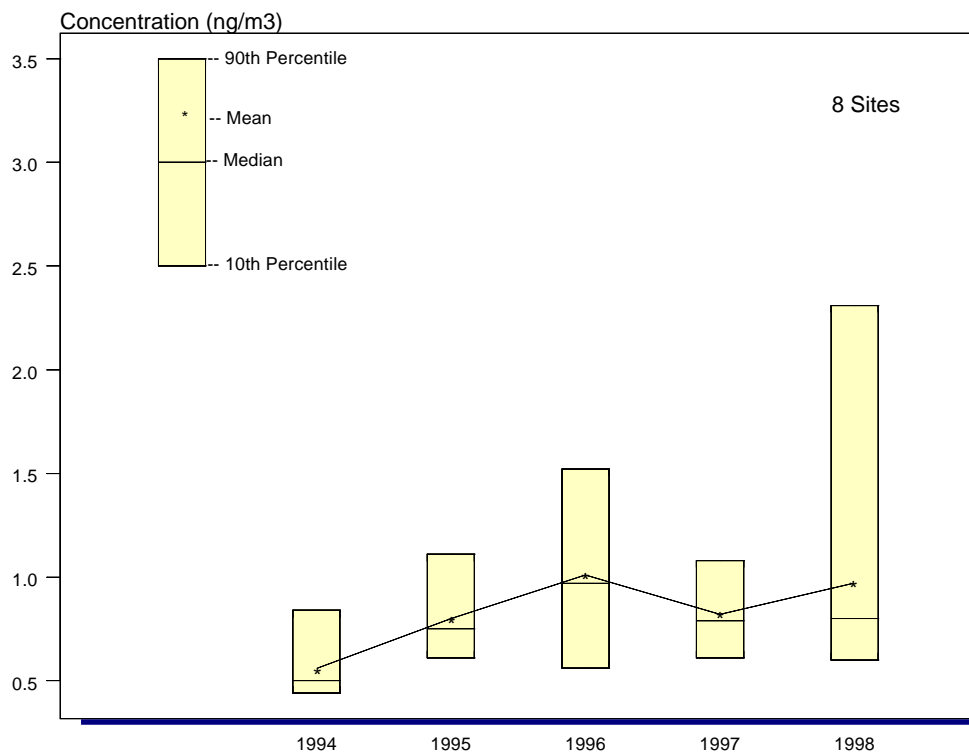


Figure 5-3. Annual Average Trends in Composite Chromium Concentrations

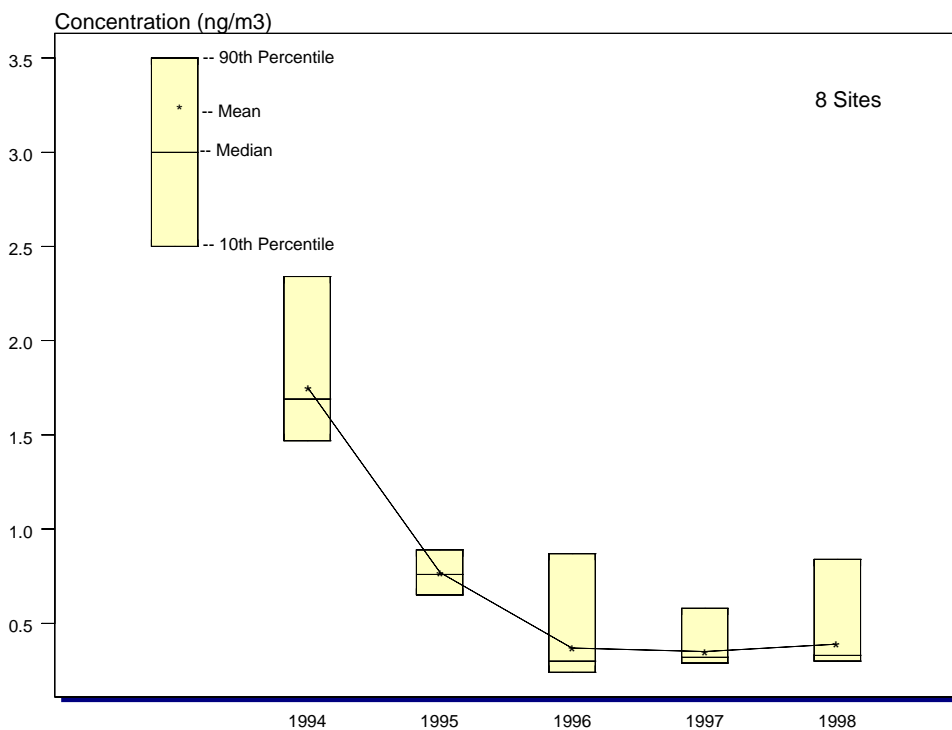


Figure 5-4. Annual Average Trends in Composite Lead Concentrations

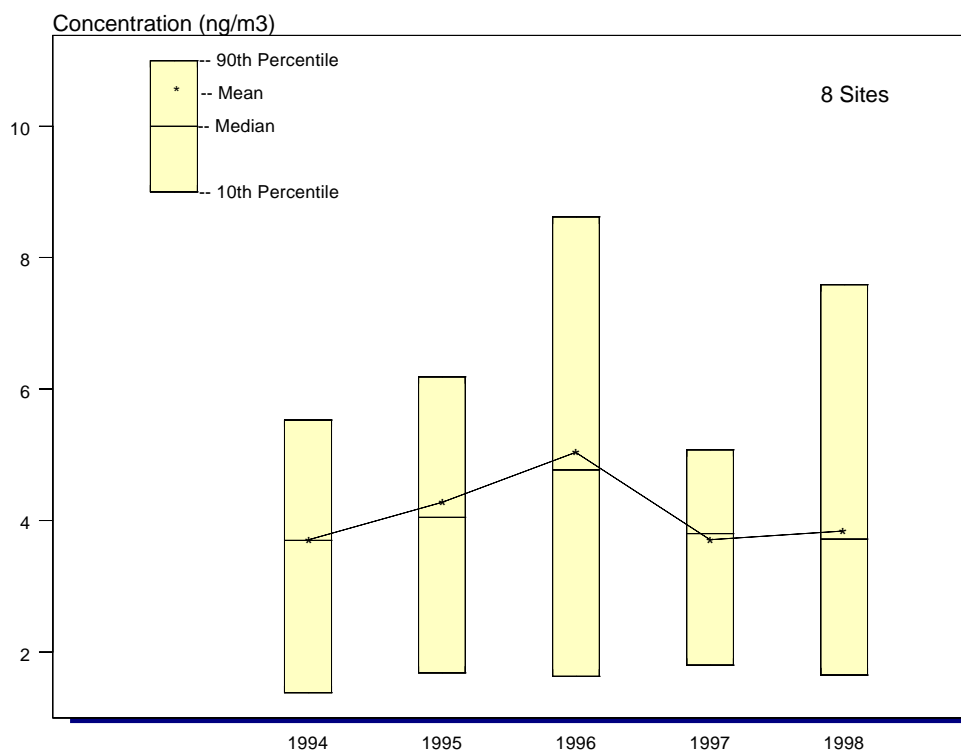


Figure 5-5. Annual Average Trends in Composite Manganese Concentrations

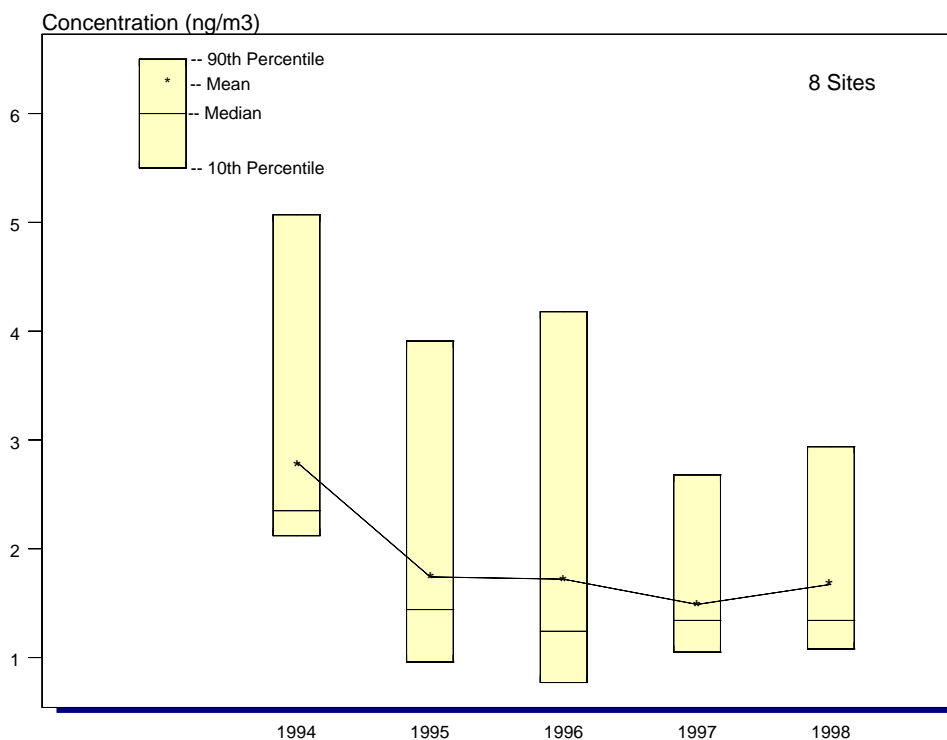


Figure 5-6. Annual Average Trends in Composite Nickel Concentrations

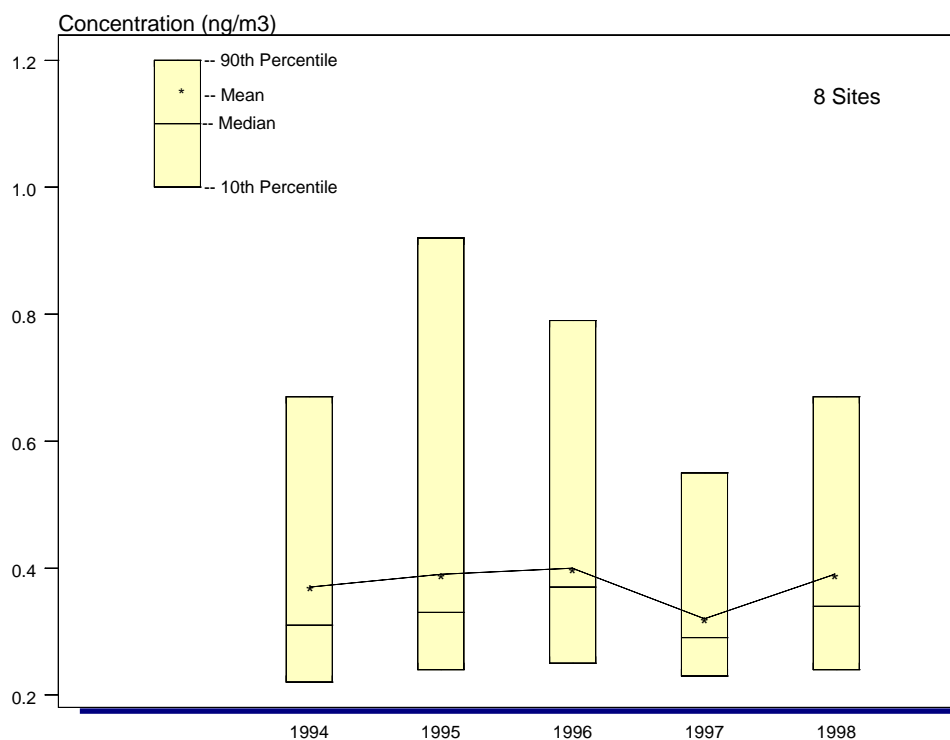


Figure 5-7. Annual Average Trends in Composite Selenium Concentrations

